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National Field Research Center, Inc, Iowa City, IA

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ENVIRONMENTAL/ENERGY
WORKFORCE ASSESSMENT
PHASE III

SALARIES & ATTENDANT PROBLEMS OF PUBLIC SECTOR ENVIRONMENTAL EMPLOYMENT

1979

Conducted by:
NATIONAL FIELD RESEARCH CENTER, INC.

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16. ABSTRACT

This report, one of 18 volumes in Phase III of the National Environmental/Energy Workforce Assessment, studies disparities between public and private sector employment conditions affecting the recruitment and retention of personnel. Because salary levels are the most tangible difference between public and private sector employment, salary discrepancies are described in detail. Attendant issues briefly considered include opportunity for advancement, availability of training, educational leave, etc.

In addition, Phase III includes 12 volumes (directories) of post-secondary environmental education programs. The other five volumes in Phase III are as follows: The Role of CETA in Direct Training and Employment; Private Sector Training Activities; Problems in Environmental Education and Training; Environmental Employment in Public Service Jobs Programs; and a Workforce Planning Bibliography.

Phase I of the Assessment evaluated workforce needs for pollution control and abatement in the U.S. during 1976-81. Phase II gathered data on training and educational programs in the post-secondary environmental education field as of 1978.

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INTRODUCTORY NOTE

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A special word of appreciation is extended to Mr. J. Donald Cook, Chief, Workforce Coordination Team, U.S. Environmental Protection Agency, Washington, D.C., and to the Manpower Officers and Workforce Coordinators from each of the U.S. Environmental Protection Agency Regional Offices.

PROJECT BACKGROUND

Overview

The National Environmental/Energy Workforce Assessment is a three-phase project to explore environmental and energy training, education, and employment in depth. The project, conducted by National Field Research Center, Inc., under the direction of the U. S. Environmental Protection Agency, is a direct response to a 1975 Congressional call for an inquiry into the availability and readiness of our national workforce for increased pollution control and abatement efforts.

In keeping with the objectives of the inquiry, this nation-wide study has been directed toward the assessment of environmental/energy workforce status and needs, national educational emphases and status, and the functional interface of the two.

PHASE I

Phase I focused upon the development of "workforce demand projections" through 1982 for all public environmental agencies. The on-site assessment culminated in a numerical profile of the growth patterns and workforce needs at the national and state levels. Stratification of the overall defini-

tion of "environmental occupation" into seven distinct vocational areas enhanced even further the applicability of the results. In addition to this public sector workforce assessment, Phase I included an overview analysis of private sector needs (conducted through an adjunct mail survey of selected businesses and industries) and a brief review of selected environmental educational programs.

Phase I was completed in May, 1977. The 70 volume final report included:

National Abstract	(1)
National Legislation	(1)
Regional Assessments	(10)
State Assessments (including District of Columbia, Virgin Islands, and Puerto Rico)	(53)
Business and Industry Assessment	(1)
National Summary	(4)

PHASE II

The Phase II objective was to determine the "state of the art" of the educational community in generating a qualified and employable environmental workforce. Community colleges, vocational-technical training institutes, colleges and universities,

and environmental training centers throughout the nation were visited; thousands of catalogs were reviewed.

The result was a profile of environmentally related post-secondary educational programs. Aspects subject to careful review included: program structure, representative course offerings, enrollment projections, program completion requirements, faculty composition, and employment history of program graduates. Program offerings were summarized and common issues and problems were discussed.

The Phase II report included 13 volumes arranged as to medium under consideration, namely:

Air	
Energy	
Noise	
Pesticides	
Potable Water	(2)
Radiation	
Solid Waste	
Wastewater	(2)
Composite	(3)

These volumes were augmented by a summary volume, an abstract, and a special volume, Business and Industry/Trade and Professional Associations.

The latter includes the results of a survey of a variety of businesses, industries, and trade and professional associations as to their efforts in training programs related to pollution control and abatement, environmental research, and resource conservation.

PHASE III

Under Phase III, materials from Phases I and II were analyzed and synthesized. Issues which were revealed to be of special importance to the future of our environmental/energy workforce, in terms of availability and quality, are being highlighted in a series of monographs, of which this is one.

The monographs focus upon salient aspects of the NE/EWA findings in greater detail than possible in the formats of the previous phases. The four monograph titles are:

- *Salaries and Attendant Problems of Public Sector Environmental Employment*
- *The Role of CETA in Direct Training and Employment*
- *Private Sector Training Activities*
- *Problems in Environmental Edu- and Training*

In addition to the four monographs, a report of the issues related to the use of CETA Title VI in carrying out environmental pollution control and abatement activities was developed. A search of the Title VI records on file with the U.S. Department of Labor, coupled with interviews with representatives of numerous prime sponsors provided the basis for the observations contained in that report.

A third objective was to develop, by medium, a listing of all post-secondary institutions offering environmental programs. All catalogs reviewed during Phases I and II were re-examined and replaced with updated versions when warranted. This information was compiled into a listing of schools offering environmental programs of study and organized as to program area. Finally, Phase III researchers developed an annotated bibliography of material of potential value to environmental workforce planners.

INTRODUCTION

In the course of Phase I and II interviews, several factors which distinguish public sector employment from that of the private sector repeatedly surfaced. These elements are pervasive. They affect public environmental agency operations to such a significant degree that the public sector environmental workforce situation cannot be appreciated fully without an understanding of the presence and dynamics of these distinguishing factors.

This monograph deals with disparities between public and private sector employment conditions and practices which affect the recruitment and retention of personnel. The emphasis is on state agencies because the disparities are most evident at that level of public sector employment.

Salary levels are, by far, the most tangible and effective differences; thus salary discrepancies and the consequences, thereof, are discussed in detail. Attendant issues which impact public sector employment are considered. Among these are opportunity for advancement, availability of training, educational leave, the merit system, public image, professional relationships, and meaningfulness of work.

These factors and the conditions they create or nourish (especially if the agency is placed in a position of obvious disadvantage by comparison with the private sector) are of paramount importance to senior agency administrators because of their debilitating effect upon agency activity and goal realization. High turnover rates, long-term vacancies, and under-qualified personnel contribute to crippling inefficiency evidenced by too-heavy workloads, continuous new employee training efforts, and interruption of normal activities.

Before entering into the detailed discussion of specific employment conditions and practices, a brief and generalized discussion of the origins and development of state environmental agencies and the federal legislation they are to implement is appropriate. It is in the following context that the employment factors addressed in the monograph have arisen and evolved.

State environmental regulatory efforts have been caught up in a whirlwind of expanding responsibilities since the enactment of the National Environmental Policy Act of 1969 (PL 91-190). In the immediate years after the implementation of NEPA, state after state followed the federal suit and established their equivalent of an environmental protection agency. In

the majority of instances a massive realignment of agency responsibilities and transfers of whole divisions of personnel were necessitated. The states were overwhelmingly successful in the reduction of duplicative responsibilities and elimination of cross-jurisdictional squabbles through the new arrangement of a single entity charged with mandates of environmental surveillance and regulation.

State agencies have had little time to assess or unify their amalgamation. They have been working at a near feverish pitch to determine what longstanding state statutes are germane to their general responsibilities and how they are to discharge those functions under the law. The states have enacted many pieces of new legislation in recent years which further delineate and specify environmental regulatory activity. But, the state agencies have been most affected by major federal legislation.

Following NEPA in rapid-fire fashion came:

Clean Air Act and Amendments of 1970 (PL 88-206, 89-272, 89-675, 90-148, 91-604 and, in 1978, PL 95-95);

Environmental Education Act of 1970 (PL 92-516);

Federal Environmental Pesticide Control Act of 1972 (PL 92-516);

Noise Control Act of 1972 (PL 92-574, and PL 95-609);

Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), 1977 (PL 95-217) and, 1978 (PL 95-576);

Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532);

Energy Supply and Environment Coordination Act of 1974 (PL 93-319);

Safe Drinking Water Act of 1974 (PL 93-523) (Amended by PL 95-190);

Toxic Substances Control Act of 1976 (PL 94-469); and

Resource Conservation and Recovery Act of 1976 (PL 94-580).

This plethora of massive new legislation was added to or amended extant federal statutes of environmental concern, such as:

Federal Insecticide, Fungicide & Rodenticide Act of 1947 (amended by PL 92-516 and PL 95-396;

Oil Pollution Act of 1961 (PL 87-167);

Solid Waste Disposal Act of 1965 (PL 89-272, 91-512, 93-14, 93-6111); or,

Radiation Control for Health and Safety Act of 1968 (PL 90-602).

Federal legislation of such magnitude by necessity brings forth correspondingly large appropriations for implementation. Figure 1 depicts the Federal commitment to environmental efforts in expenditures, 1972-1977.

Figure No. 1 *

ENVIRONMENTAL OUTLAYS,
by category, 1972-1977

* Reprinted from Office of Management and Budget, Special Analyses: Budget of the United States Government, Fiscal Year 1977 (Washington, D.C.: U.S. Government Printing Office, 1976) p. 296.

Throughout the period depicted in Figure 1 the total Federal outlay for environmental programs has increased dramatically; the percentage of the total transferred to state and local governments has also continued to increase. In 1977, the transfers amounted to $4,686,900,000; the direct Federal outlay was $3,988,000,000. The administration of Federal funds demanded an explosive expansion of state and local staffs in the early 1970's.

The fledgling agencies were burdened enough dealing with their own creation and development and with their roles in implementation of Federal laws, when they were caught up in the midst of a period of significant economic unpredictability.

This combination of conditions has taken its toll on the now adolescent state agencies in the form of less than admirable credibility and noticeable inefficiency in a cause/effect, chicken/egg conundrum evidenced in personnel problems revealed in employee turnover.

I. EMPLOYEE TURNOVER

The Revolving Door Syndrome

Interviews conducted with state environmental agency personnel during Phase I of the National Environmental/Energy Workforce Assessment revealed employee turnover to be a common problem. The deleterious effects of personnel changes are particularly evident in the pollution control and abatement areas of air, potable water, wastewater, radiation, and to some extent, solid waste.

Because each state was considered in a separate volume and employee turnover was only one of several minor issues discussed in NE/EWA Phase I, the full extent to which the turnover problem pervades the state pollution control and abatement agencies was not readily apparent. Details as to employee turnover from the Phase I state volumes have been augmented with the notes of interviewers to provide the data for the first section, The Extent of Turnover.

The second section, The Effects of Turnover, is a general discussion of the detrimental effects employee turnover has upon the operations of state environmental agencies.

The Extent of Turnover

Depending upon the pollution control area and the level of the position, state environmental agency sources indicated that it takes one to five years for an individual to become independently competent. Some state agency divisions witness a complete turnover of junior level professionals in that five year span.

Figures 2 through 4 present data collected during Phase I concerning turnover rates for engineers, technicians, and scientists in state pollution control and abatement agencies by media (air, potable water, solid waste, and wastewater). Figure 5 depicts turnover rates for health physicists, chemists, and technicians in state radiation regulatory agencies.

A discussion of the information portrayed in the graphs follows Figure 5.

FIGURE 2

RATES OF EMPLOYEE TURNOVER IN STATE ENVIRONMENTAL AGENCIES - ENGINEERS

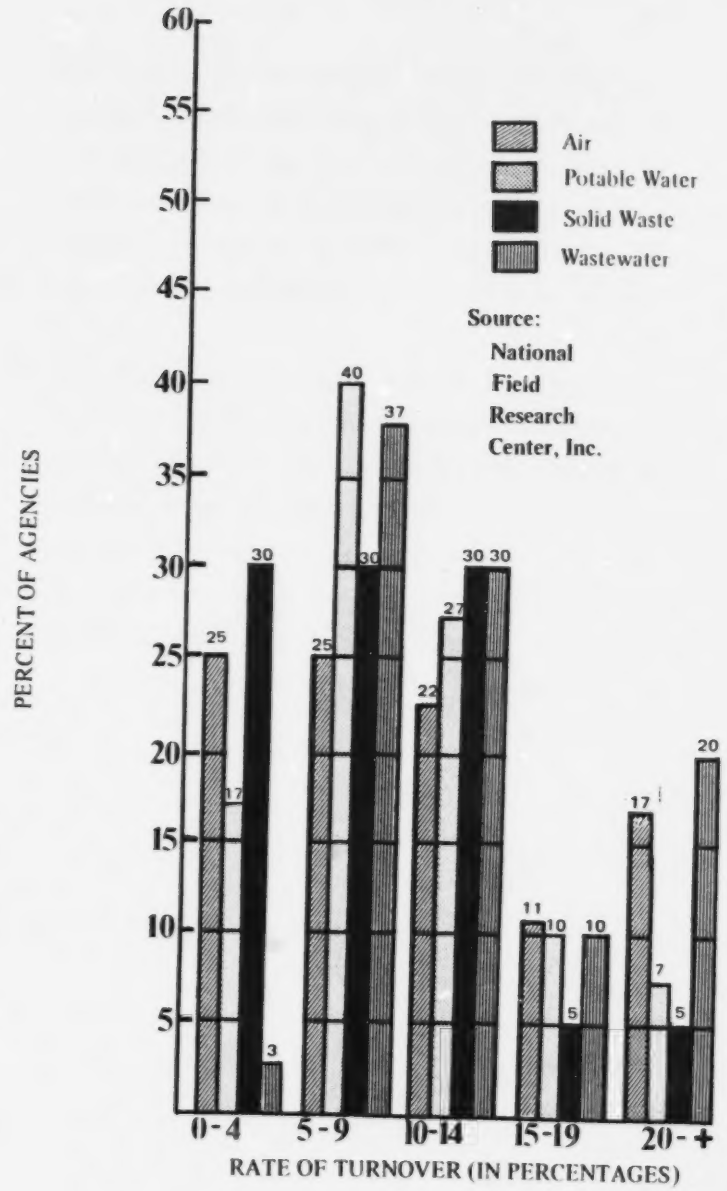


FIGURE 3

RATES OF EMPLOYEE TURNOVER IN STATE ENVIRONMENTAL AGENCIES– SCIENTISTS

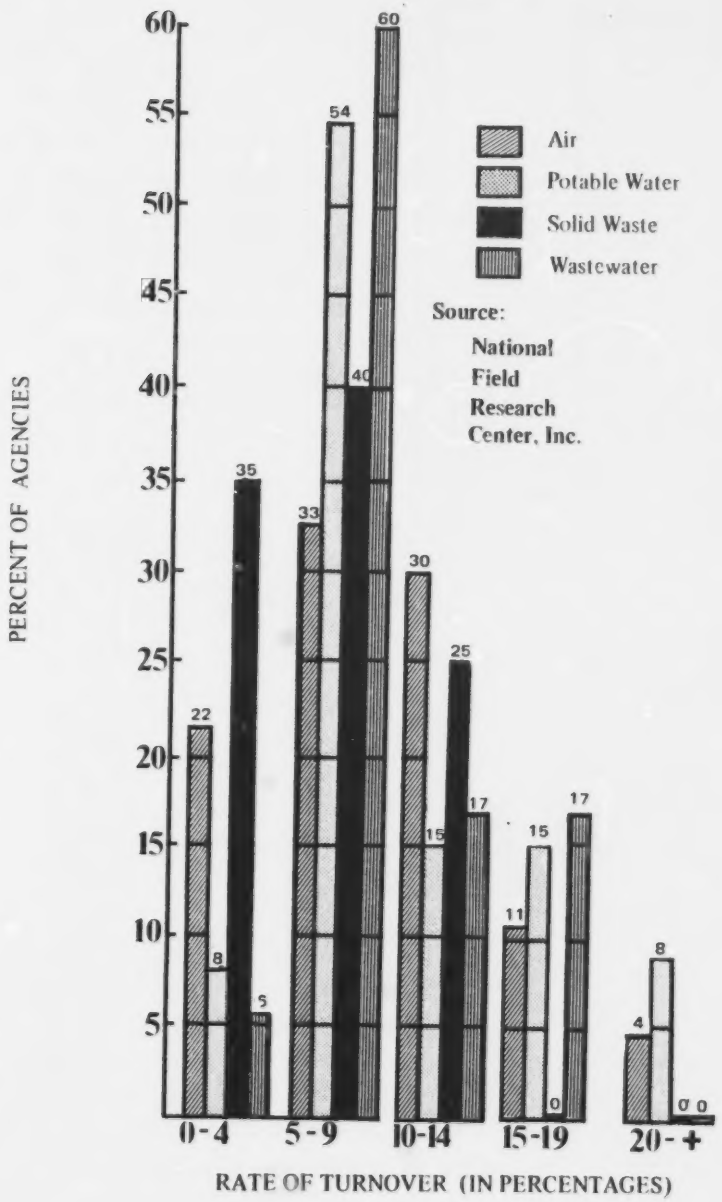


FIGURE 4

RATES OF EMPLOYEE TURNOVER IN STATE ENVIRONMENTAL AGENCIES – TECHNICIANS

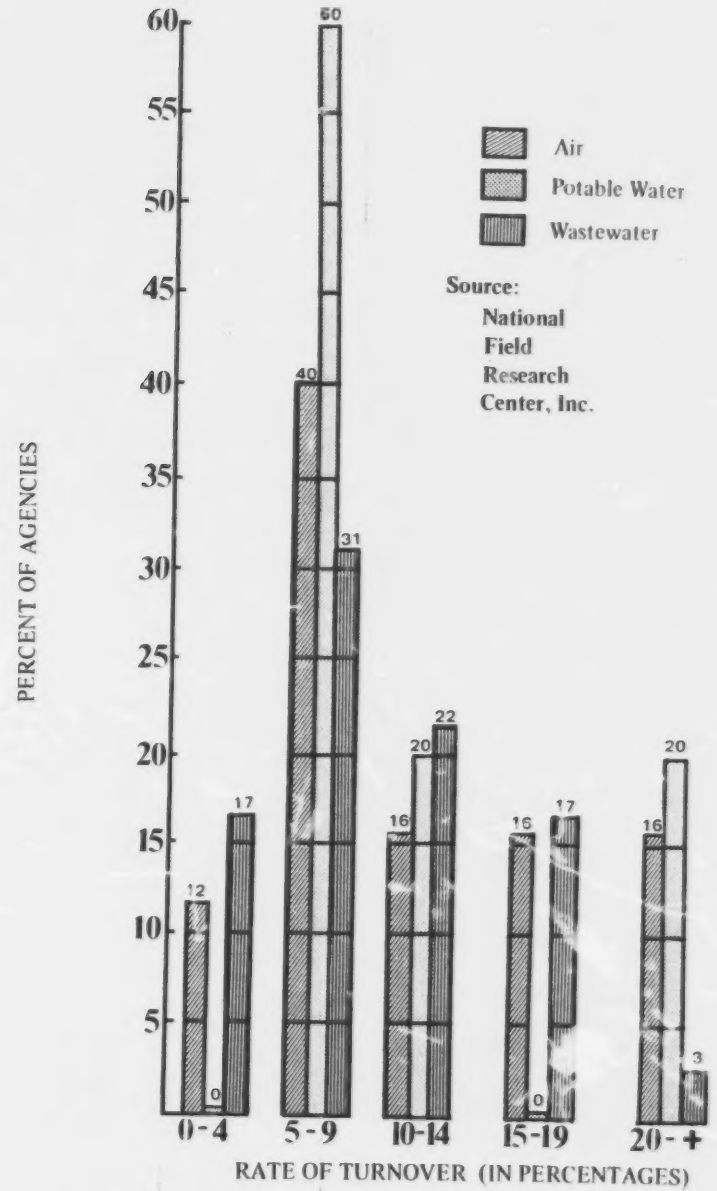
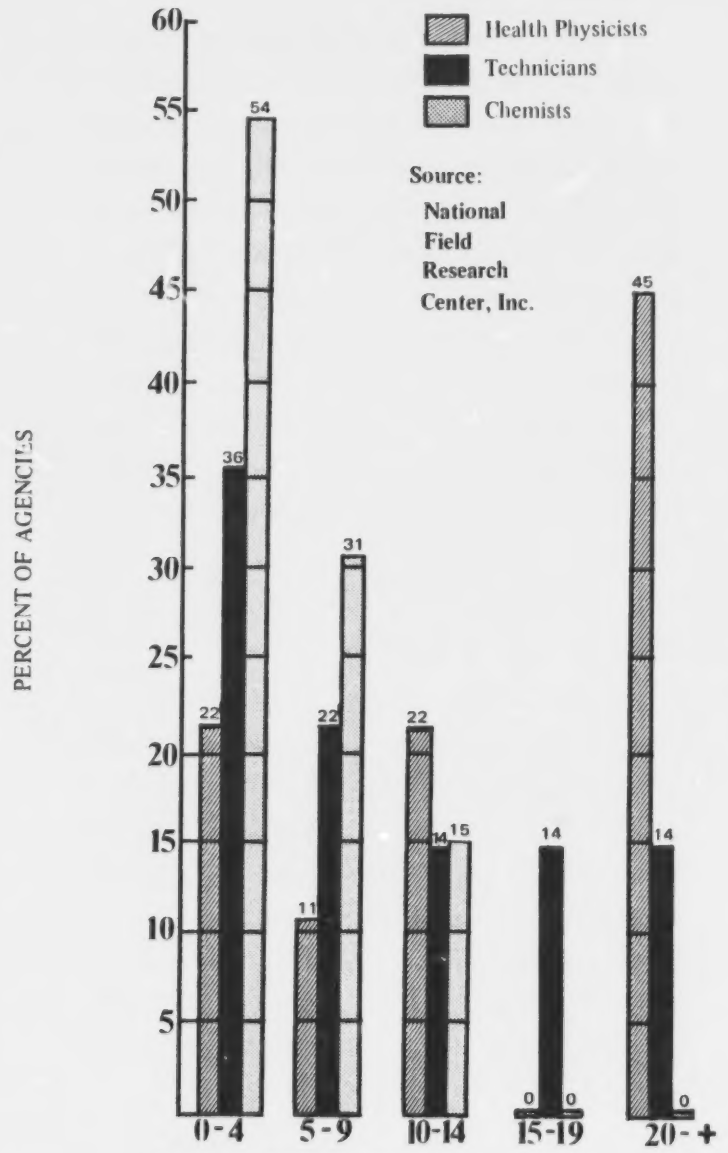


FIGURE 5

RATES OF EMPLOYEE TURNOVER
IN STATE RADIATION CONTROL PROGRAMS



Engineers

Figure 2 reveals that of the agencies for which annual turnover rates for engineers were available, 40% of the solid waste divisions reported at least a 10% annual engineering personnel turnover. Potable water divisions fared a little worse with 44% reporting at least a 10% turnover. Fifty percent of the air divisions and fully 60% of the wastewater programs reported the same. Twenty percent of the wastewater programs and 17% of the air programs recorded a 20% or greater annual turnover rate for engineers. The lost work time and new employee training time are significant factors which compromises the operations of these divisions.

Scientists

Figure 3 presents annual turnover data for scientists. Although not as crippling as the rates for engineers, the attrition rates for scientists are significant. Solid waste programs again fare best, with 25% of the programs reporting a 10-14% annual turnover rate. Thirty-four percent of the wastewater programs registered a 10% or greater turnover rate (17% at 10-14% and 17% at 15-19%). Potable water divisions reported similar figures; 38%

registered a 10% or greater turnover (8% at a rate of at least 20% annually). Air programs showed the highest turnover rates for scientists. Forty-five percent reported a 10% or greater turnover rate (30% in the 10-15% turnover range).

Technicians

Figure 4 depicts annual turnover rates for technicians. Solid waste programs are not included as data were insufficient. Forty percent of the potable water programs recorded a 10% or greater annual turnover of technicians, as did 42% of the wastewater programs, and 48% of the air programs. The personnel turnover at the technician level is a factor of concern to many programs of equal importance as that for engineers and scientists.

The technician level positions are best described as "feast or famine." Some divisions reported only minimal turnover among technicians because there is an overabundance of persons with similar training; others noted rates of vacancy which rivaled or exceeded that for engineers, because experienced, trained technicians are in great demand.

Radiation Programs

Because of the radically different staffing configuration of radiation programs, they are presented separately in Figure 5. Eighty-five percent of the radiation programs reported less than 10% annual turnover for chemists; 15% reported turnover in the 10-15% range. Subsequent to Phase I some radiation agencies have reported a dramatic increase in turnover among chemists. It is thought that agency salaries for chemists are no longer on a par with those available in the private sector.

The figures for technicians are not as favorable as for chemists; 32% of the programs reported technician turnover at 10% or greater (14% reporting in each category of 10% or above).

By far, the most significant personnel problem for radiation divisions is the turnover among health physicists. Twenty-two percent of the programs reported a 10-14% turnover rate; an overwhelming 45% reported an annual turnover of 20% or greater. These state agency programs are serving as on-the-job training centers for health physicists who then move on to jobs in national laboratories and nuclear power plants.

Clerical Workers

One further area of turnover is deserving of note. Several agencies reported that low salaries of clerical personnel promotes hiring of poorly qualified people and consequent heavy turnover, both of which severely hamper the efficiency of the professional personnel.

Employee turnover rates are sufficiently high among environmental pollution control and abatement agencies to be disruptive to task accomplishment essential to fulfillment of agency mandates.

The Effects of Turnover

Clearly, the agencies are short-changed as they must deal continually with new employees who perform, understandably, at less than optimal levels during training and adjusting to a new job. Simultaneously, the agencies lose substantial productivity as relatively seasoned employees' time is diverted from other pursuits to assist with on-the-job training.

The effects of turnover are compounded because state agencies typically must seek replacements among recent college or technical school graduates due to a relatively low starting salary and limited budgetary allocations for professional meetings and journal advertising. Thus, replacements usually have little or no job experience.

The ramifications of professional employees leaving the agency for private sector jobs extend beyond the internal organization and routine functioning of the agency. Understandably, education, skill, and experience levels should be comparable between the regulatory agency employee and his private sector counterpart. This frequently is not so; the employee shift from public to private sector positions is a major factor which places the agencies at a distinct disadvantage in this respect.

The agency employee has several attributes which are appealing to private sector employers. He has the basic type of education appropriate to a job in industry. He may have an advanced degree paid for through the agency (at least in terms of released time, perhaps with a stipend). The additional formal education and training received during his tenure as an agency employee equips him with a more specialized knowledge base and specialized on-the-job experience than that of the recent college graduate.

These factors and a probable greater maturity than that of the recent graduate minimize the training time required to master a new job. The transferring employee can be expected to attain peak production more quickly than the individual assuming his first professional position. Industry benefits greatly by not having to carry the burden of fully training a new employee. The private sector's new employee has already learned the basics at the expense of the public agency. He need only learn the aspects specific to his new job.

This of course exacerbates the situation, worsening the public sector's relative position. Dollars spared the private sector by virtue of the publicly

subsidized training can be reallocated to salaries and fringe benefits, making private sector employment even more attractive to agency personnel.

The former agency employee also brings with him the incalculably valuable working knowledge of an agency which regulates the activities of his new employer. The private sector employer has much to gain from the hiring of agency personnel; the agency loses commensurately.

Indisputably, employee turnover is a perennial problem of major proportion. It poses a significant impediment to the achievement and maintenance of an acceptable performance level within affected agencies. The causes of turnover, therefore, are critical to the agency.

II. CAUSES OF EMPLOYEE TURNOVER

Propelling the Revolving Door

Although employee turnover was generally recognized as seriously hampering agencies' efforts, personnel interviewed during Phase I of NE/EWA often viewed the current attrition rates as inevitable. A close look into the causes of turnover may provide indications as to policies, practices, or conditions, which if altered, could reduce turnover rates noticeably.

The sections following begin with a discussion of the recruiting process and the handicaps under which state agencies conduct recruiting. The effects of recruitment shortcomings upon applicant selection and employee retention are discussed.

The section on salaries documents the unfavorable position of state agencies compared with other employers in this critical area. Aspects of the supply and demand in fields which comprise the bulk of pollution control and abatement agency professional personnel are also considered.

Impediments to career advancement in state agencies and the importance of meaningful work and circumstances which compromise it are discussed in the final sections.

Recruitment

Frequently, the turnover problem begins with the recruitment process. Success in recruiting is measured in terms of (1) the ability to attract highly qualified candidates; (2) the selection of the applicant who will assume responsibility, perform at the desired skill level, and establish a good rapport with other workers; and, (3) the retention of the employee over a long term in a mutually rewarding atmosphere. Failure to meet any of these criteria is an indication of inadequacy in recruitment policy, practices, or technique.

Attracting Highly Qualified Candidates

Salary level aside for the present, there are aspects of attracting job candidates in which state agencies are often at a disadvantage.

Producing the typical job announcement sheet which includes job description, responsibilities, and qualification requirements is a standard practice of both private and public sector employers. It is the distribution and follow up of the job announcement form that the agencies are deficient. The disadvantages of the public agencies as compared with private sector employers, in this regard, fall into

two categories: problems of a general nature which are typical of most public sector recruitment/employment practice constraints; and deficiencies which are relatively agency-specific. Restrictions and procedures imposed by the legal requirements and bureaucratic functioning of state merit systems are examples of the former.

Merit Systems

Merit systems, which exist to minimize the hiring of truly unqualified persons, often result in also minimizing the probability of hiring the most qualified persons. The merit system essentially consists of a set of hurdles that a job seeker must negotiate in order to be considered eligible for a position. The very obstacles erected as stumbling blocks to the unqualified also act as barriers sepathe applicant from the potential employer.

The applicant must undergo the gamut of testing, interviewing, and classification (much of which is peripheral to the specific job he is seeking) before he is placed on a list as an acceptable candidate eligible for consideration for a particular position. The process can be tiresome, irksome, and often is drawn out over an extended period of time. When the maze of merit system procedure is con-

trasted to the direct approach of private sector hiring systems, many self-assured well-qualified individuals do not even consider public sector employment.

Upper middle level positions are particularly difficult to fill in many instances because the agency is restricted to interviewing only the top three to five candidates as determined through the state civil service system. Discrepancy between qualifications and salary range, unfamiliarity of merit system personnel with the specific nature of a position, and bureaucratic delays in the interviewing and hiring procedures are frequently cited by agency personnel as crippling effects of the merit system.

Several persons interviewed in Phase I of the NE/EWA commented that the civil service register of acceptable candidates usually has fewer than three individuals listed as qualified for any given position at the upper middle level. This often necessitates a further search for candidates and then causes a delay in hiring because the candidate must be added to the merit list through normal (often lengthy) procedures.

Patronage

The persistence of patronage practices, carried out despite the merit system, is problematic at

the upper middle position level. Jobs which are essentially administrative, rather than of a technical nature, are often viewed as minor political plums. In many states, selection of a job candidate from the merit list may be subject to approval of the governor's office. Through this practice, an agency is faced with a choice of an extended vacancy or hiring a third or fourth ranked applicant. In this manner, many qualified persons are effectively eliminated from agency employment and are dissuaded from seeking public employment in the future.

Professional Contacts

An example of an agency-specific deficiency is the matter of professional contacts. Agency personnel find themselves in a disadvantageous position from which to develop and maintain professional relationships. The very nature of the environmental agency is responsible, in part.

Fiscal constraints, in the form of severely limited travel budgets, release time, etc., serve to minimize opportunity for professional mingling in non-workplace settings. The professional contacts within the work context often find the agency employee on a less-than-equal footing for two reasons: (1) he is often seen in the watchdog or bearer

of bad tidings role; (2) he may be the personification of an agency's poor image (discussed in greater detail in a subsequent section).

These limitations upon the agency employees' professional contacts have major impacts upon recruiting activities. The opportunities to advertise a job opening by word-of-mouth in informal surroundings are lessened. Private sector professionals with whom the agency employee deals are not interested in making what they consider a move down.

Two additional factors compromise agency recruiting efforts. In many instances those persons responsible for recruitment are often young, with limited experience. They have few personal professional contacts and belong to few professional associations. Also, not infrequently, professionals of varying age and experience involved in recruiting express antagonism toward the academic community. This attitude does little to improve rapport with university personnel who are, in essence, the major suppliers of potential new employees.

When the job announcement sheet prepared by the public agency is as complete and the starting salary roughly analogous to that of the private sector, other factors undercut the attraction of highly

qualified candidates. The gordian knot of merit systems, patronage practices, and limited professional contacts reduces the visibility of the public agency as a potential employer and hobbles the agency in its attempt to reach and recruit superior people.

Selecting the Applicant

Selecting the applicant who will assume responsibility, perform at the desired skill level, and establish a good rapport with other workers would, on the surface, appear to be no more difficult for the public agency than for any other employer. But this is the second step in the cumulative process of recruitment; the ramifications of the inadequacies of the methods of attracting highly qualified candidates are intensified at this critical point.

The selection often must be made from a severely limited number of applicants. The selection decision may be modified by political considerations, not necessarily in the best interest of the agency's mandate. None of the applicants may be particularly well-qualified for the position, but the agency may be limited to choosing among them, rather than conduct a further search. The candidates frequently have limited or no work experience and, therefore, may be unused to the degree of responsibility

required and have some difficulty establishing a good rapport with fellow workers. The lack of experience factor may be especially detrimental if the job includes frequent contact with more experienced peer personnel in the private sector.

The hiring decision, then, is often made from a limited pool of prospects and based on insufficient data as to probable performance level. No agency can expect to come out ahead when hiring decisions repeatedly reflect this degree of trial and error process.

Retaining the Employee

Retention of the employee over a long term in a mutually rewarding atmosphere is the obvious goal and ultimate criterion of success in the recruitment process. Failure in employee retention can, of course, be attributed to conditions which arise subsequent to recruitment; but, this can be delusive.

It is foolish to assume that the shortcomings of the applicant attraction and selection process could lead to anything but a high turnover rate. Dissatisfaction, from the perspective of the employer, employee, or both, is to be expected when recruitment is conducted under the constraints depicted above.

Hiring Under-Qualified Persons

As evidence of the extent to which recruitment difficulties affect agency operations, several agencies, unable to hire qualified people to fill vacancies, have created a "trainee" category. Under this policy the individual is hired at a lower salary than the entry level rate for the position he is to fill. After a training period of several months to a year, in which other agency personnel work with him to bring his knowledge and skills to the level required, he may be promoted to the title and pay of the originally vacant position. Alternatively, he may take advantage of his training and apply elsewhere (now having the experience to command a higher salary), or he may be discharged from the agency because the requisite skill level was not achieved. In either of these events, the agency must start anew looking for a qualified individual.

The recruitment process of state environmental agencies should be subjected to critical review. Efforts to ameliorate the conditions which compromise the attraction, hiring, and subsequent retention of highly qualified personnel will result in marked improvement in overall agency performance.

Salaries

As noted in the previous section, there are many facets of attracting qualified personnel other than salary. Subsequent sections discuss still other aspects of employee retention. There is no denying, however, that salary is the fulcrum as these aspects are weighed in an individual's employment decision-making process. The relative importance placed on any of the other factors is dependent upon the salary level of one employment option as compared with another viable option.

The key question from the perspective of the agency is, "Is the salary appropriate?". The measures of appropriateness are: (1) Is the salary level commensurate with the skills, experience, and responsibility required of the position as compared with other positions in the agency? and, (2) Is the salary competitive with that offered elsewhere for similar skills, experience, and responsibility?

The importance of salary is comparability, modified by supply and demand. The comparability of salaries must be considered in the context of supply and demand of the qualified workforce.

The tables in this section depict a variety of data pertinent to salaries and workforce supply

and demand. Each table is followed by a discussion of the data. Applicability of data found in one table to that of others is noted.

The overwhelming majority of professionals employed by state pollution control and abatement agencies are engineers or scientists. To date, the best overall employment data regarding these professions are derived from the 1974 national sample of scientists and engineers. The sample is based on the 1970 census, and therefore, does not include persons who became employed subsequent to early 1970. It is estimated that approximately 60% of the nation's engineers and scientists were included in the sample.

Tables I and II present data derived from that sample. Table I is a reproduction of portions of Table B-1.–Employment characteristics, National Sample: 1974, published by the National Science Foundation (NSF) in Part 2 Employment, as a volume in the Surveys of Science Resources Series, NSF 76-323. Table II is derived from data published in the Digest of Education Statistics, 1976 edition, by the National Center for Education Statistics (Table 167.–Selected Characteristics of scientists and engineers, by field: United States, 1974). A discussion of the data and the specific application to environmental agencies follows the tables.

TABLE I

Selected Employment Characteristics
All Categories of Engineers and Scientists
1974 National Sample

TYPE OF EMPLOYER	NUMBER	PERCENT	MEDIAN ANNUAL SALARY
Business and Industry	566,961	56.0	$19,000
Educational Institutions	134,910	13.3	N/A
4-year Colleges/Universities	115,440	11.4	$19,400
2-year Colleges	9,828	1.0	$17,400
Other Educational Institutions	9,642	1.0	$19,000
Hospital/Clinic	9,433	0.9	$17,500
Nonprofit Organizations	28,292	2.8	$20,100
Military	3,172	0.3	N/A
Federal Government	99,421	9.8	$21,700
State Government	37,926	3.7	$16,400
Local Government	35,843	3.5	$18,900
Other Government	19,150	1.9	$19,400
Other	75,677	7.5	$19,600
Not Reported	2,301	0.2	$25,100
TOTAL EMPLOYED	1,013,086	100.0	
NOT EMPLOYED	66,612	(6.2% of sample)	
Seeking	11,481	(1.1)	
Retired	38,383	(3.6)	
Other	16,748	(1.6)	
TOTAL SAMPLE	1,079,698		

Source: National Science Foundation

Table I presents data regarding all persons in the 1974 sample. Included in these overall figures are: earth scientists, oceanographers, atmospheric scientists, mathematical scientists and mathematicians, statisticians, computer specialists, life scientists, environmental scientists, and engineers.

The table provides the following information salient to the discussion of public sector pollution control and abatement employment:

– Private sector employment accounted for 739,596 (73%) of the total; Business and Industry alone totaled 566,961 (56%) of those employed. The public sector (excluding Military) employed 192,340 (18.9%). Of these, more than 50% were employed by the Federal Government (9.8% of all employed), Local and Other Government employed a combined total of 54,933 (5.4% of those employed), and State Government employed 37,926 (3.7%).

– Although 66,612 (6.2% of the sample) were unemployed; only 11,481 (1.1%) were seeking employment. Unemployment was not a significant factor for these professionals; it was a seller's market.

– The median annual salary of those employed in State Government was substantially lower than that for any other employer. It was 6% lower than the median for the second lowest group (2-year colleges); 14% lower than that for Business and Industry; and 24% below the median for the Federal Government, the highest level reported by employer type.

TABLE II

SELECTED EMPLOYMENT CHARACTERISTICS OF ENGINEERS AND SCIENTISTS MOST COMMONLY EMPLOYED IN POLLUTION CONTROL/ABATEMENT ACTIVITIES 1974 NATIONAL SAMPLE

A.: Emphasis on Segment of Each Field Represented in Each Employment Category

Type of Employer	Overall Number	Environmental Scientists Number	Environmental Scientists Percent	Life Scientists Number	Life Scientists Percent	Physical Scientists Number	Physical Scientists Percent	Engineers Number	Engineers Percent
Business & Industry	566,961	11,603	41.5	15,415	22.0	61,187	54.6	477,608	73.8
Educational Institutions	134,910	5,832	20.9	29,651	42.4	26,380	23.5	20,227	3.1
Nonprofit Organizations	28,292	502	1.8	2,799	4.0	4,989	4.5	13,424	2.1
Military	3,172	12	0.0004	132	0.2	162	0.1	2,427	0.4
Federal Government	99,421	4,940	17.7	13,300	19.0	11,675	10.4	56,797	8.8
State/Local/Other Government	92,919	3,125	11.2	7,766	11.1	6,334	5.7	61,036	9.4
TOTAL	925,675	26,014	93.1	69,063	98.7	110,727	98.8	631,519	97.6
OVERALL TOTAL *		27,928		69,977		112,069		647,565	

* Includes Employment categories not contained in table.

B.: Emphasis on Comparisons of Fields as Components of Employment Categories

Type of Employer	Overall Number	Percentage of Overall	Number By Field		
		Environmental Scientists	Life Scientists	Physical Scientists	Engineers
Business and Industry	566,961	2.1	2.7	10.8	84.2
Educational Institutions	134,910	4.3	22.0	19.6	15.0
Nonprofit Organizations	28,292	1.8	10.0	17.6	47.4
Military	3,172	0.4	4.2	5.1	76.5
Federal Government	99,421	5.0	13.4	11.7	57.1
State/Local/Other Government	92,919	3.4	8.4	6.8	65.7
Median Annual Salary		$19,927.00	$17,596.00	$19,358.00	$19,391.00

Source: U.S. Department of Health, Education, and Welfare, Center for Education Statistics

The National Science Foundation National Sample Report noted that 135,000 (29%) of the respondents worked in environment/pollution control and abatement. Of these persons, nearly 70% were engineers, 12% were life scientists, 12% were physical scientists, and 3% were environmental scientists. Table II contains data specific to these four categories.

With the exception of the overall number in each employer group, the data in Table II are derived from those of the Digest of Education Statistics table. The total number of scientists and engineers varies slightly from the total in the NSF report, but the difference is so slight that percentages are not affected. Employer categories are not as specific as those of the NSF report; educational institutions are not broken out, and all governments other than Federal are combined as "Other Government."

Table IIA presents the number of environmental scientists, life scientists, physical scientists, and engineers employed by type of employer and depicts the percentage of each profession represented by the number employed in each Type of Employer category. Example: Of 566,961 scientists and

engineers employed by Business and Industry, 11,603 are environmental scientists, representing 41.5% of the environmental scientists in the sample.

Table IIB indicates the percentage of each profession represented in each Type of Employer category, i.e., 2.1% of the scientists and engineers in Business and Industry are environmental scientists.

The median annual salary for each of the four professions is also given. It should be noted that the median annual salary among scientists and engineers employed in state government ($16,400) as shown in Table I is more than $1,000 lower than the lowest median annual salary among the four professions in Table IIB ($17,596 for life scientists), a difference of 6.7%; and more than $3,500 lower than the highest median annual salary ($19,927 for environmental scientists), a difference of 17.7%. The shortfall for physical scientists is 15.3%; and for engineers, who comprise the largest segment of professionals at the state agency level, 15.4%.

Indication of state and local governments' share of employment of engineers of all types compared with overall employment of engineers is provided in Table IIA. Of a total of 647,565 engineers employed in January of 1974, 61,036 (9.4%) were employees of state/local or other governments (excluding Federal).

Recognition of state agencies as potential employers may be lessened simply because the agencies' number of current employees is far outweighed by those of other employers.

A similar overall situation applies to environmental and life scientists. The 1974 figures show 27,928 environmental scientists employed; 3,1[illegible]5 (11.2%) by state or local governments. Of 69,977 life scientists, 7,766 (11.1%) were in state or local government positions. For physical scientists the comparable figures were 112,069 total, and 6,354 (5.7%) in state/local government employ.

Figures representing the supply side of the coin further emphasize the overwhelming necessity of competitive salary levels if qualified professionals are to be employed by state agencies. The 1976 edition of the Digest of Education Statistics includes the unemployment statistics for the professions in the 1974 sample. Only 0.8% of the engineers in the labor force were unemployed; of environmental scientists, 0.9% were unemployed. The unemployment rate was 0.7% for both life scientists and physical scientists. Obviously such low unemployment rates reflect the high demand for these professional fields.

The data in Tables III and IV are derived from figures published by the College Placement Council (CPC) over a five year period. The CPC salary surveys are comprised of entry level salary offers (not acceptances) made to degree candidates in selected curricula. The reports are based on offers made during the normal college recruiting period, September through June, to students of a representative group of more than 150 schools throughout the nation.

The CPC surveys do not provide breakout information for local and state government; thus, the two are combined in Tables III and IV. The degree to which this affects the figures as they pertain to state government alone is not directly available, however, the median annual salary column in Table I provides a fair indication. In Table I, State Government, Local Government, and Other Government are noted separately. The difference between state and local government median salaries is $2,500 (13.2% higher for local government employees). The difference between the median annual salary of state and other (non-federal, non-local) government employees is $3,000 (15.5% in favor of the latter). Table I also indicates 37,926 employed in state government and 35,843 in local government, for a combined total of 73,769 (48.6% local, 51.4% state).

Given the above, it is reasonable to assume that the CPC State/Local Government category is made up of a fairly equal mix of state and local government employees.

A lower median annual salary will be reflected in lower starting salaries. The average annual salary offers for State/Local Government in Tables III and IV are, therefore, somewhat inflated compared with the average for state governments, alone. The difference between the average annual salary offer by state governments and that of all types of employers combined is even greater than for state/local governments combined as presented in the tables.

The College Placement Council data appear as average monthly salary offers in the CPC Salary Surveys. These have been converted to average annual salary offers for use in Table III. All salary related comparative data were then computed from these base figures.

In addition to the salary information in Tables III and IV, a column designated "Consumer Price Index Change" is included. This column provides an additional aspect of comparison for the changes in salary offers. The percentages in this column were computed by determining the difference be-

tween the Consumer Price Index for June of one year and June of the next year and calculating the percentage of change. The Consumer Price Index figures were obtained from the August edition of the Monthly Labor Review (U.S. Department of Labor, Bureau of Labor Statistics), for the years 1974 through 1978. June to June was used as the annual period because of the September to June 30 recruitment period of the CPC data. Therefore, the Consumer Price Index percentages in the table may vary from the standard annual figures of the Department of Labor based on January to January.

TABLE III

National Average Annual Salary Offers
Technical Curricula 1973-74 through 1977-78

Section 1: SALARY COMPARISONS

Recruiting Period	TYPE OF EMPLOYER										
	Business		Manufacturing/ Industry		Government- Federal		Government- State/Local		Non-Profit/ Educational Org.		Consumer Price Index Annual
	Average $ Offer	Change	Average $ Offer	% Change	Average $ Offer	% Change	Average $ Offer	% Change	Average $ Offer	% Change	% Change
1977-78	$13,164	11.6%	$16,704	9.5%	$14,040	13.7%	$13,068	10.9%	$11,508	7.8%	7.4%
1976-77	11,796	7.2%	15,252	7.8%	12,348	6.1%	11,784	3.9%	10,680	7.9%	6.9%
1975-76	11,004	6.6%	14,148	6.3%	11,640	2.0%	11,340	0.5%	9,900	5.2%	5.9%
1974-75	10,320	3.7%	13,308	11.7%	11,412	9.2%	11,280	8.2%	9,408	8.7%	9.3%
1973-74	9,948	6.8%	11,916	7.8%	10,452	11.5%	10,428	5.3%	8,652	1.7%	11.1%

Section 2: PORTION OF SAMPLE COMPARISONS

	Number	%	Number	%	Number	%	Number	%	Number	%	Total
1977-78	790	2.3%	31,769	91.1%	1,146	3.3%	568	1.6%	612	1.7%	34,885
1976-77	666	2.7	22,784	91.7	567	2.3	384	1.5	448	1.8	24,849
1975-76	490	3.0	14,826	89.6	499	3.0	299	1.8	429	2.6	16,543
1974-75	387	2.5	13,001	85.3	1,064	7.0	491	3.2	298	2.0	15,241
1973-74	505	2.4	18,534	89.0	1,042	5.0	362	1.7	387	1.9	20,830

Sources: College Placement Council and U.S. Department of Labor, Bureau of Labor Statistics

The technical curricula represented in the data in Table III are comprised of the scientist and engineering categories common to Tables I and II. The dollar differences between the average annual salary offers by state/local government and the offers by other employers are as follows:

	Business	Manufacturing Industry	Federal Government	Non-Profit/ Educ. Organizations
77-78	$ 96.00	$3,636.00	$ 972.00	-$ 1,560.00
76-77	12.00	3,468.00	564.00	- 1,104.00
75-77	-336.00	2,808.00	300.00	- 1,440.00
74-75	-960.00	2,028.00	134.00	- 1,872.00
73-74	-480.00	1,488.00	24.00	- 1,776.00

Only as compared with non-profit and educational organizations do state/local average beginning salary offers maintain a distinct, substantial advantage. Over the five year period the initial advantage over the offers of business employers has been lost. At the beginning of the five year period, state/local government offers were essentially equal to those of the Federal government. By the 1977-78 recruiting season the comparative position of state/local offers had eroded by more than $900. Most disturbing is the steady, substantial

loss of position compared with manufacturing/industry employers. The five year period opened with a difference of $1,488; for the final (1977-78) recruiting season, manufacturing/industry average offers exceeded those of state/local governments by $3,636, outstripping the gains in state/local government offers by $2,148.

These dollar differences attain even greater significance when the factor of relative percentages of number of offers made is considered. Manufacturing/industry employers consistently made approximately 90% of the beginning salary offers throughout the five year period. It is reasonable to assume that the higher offers were made to and accepted by the higher ranking, better qualified candidates. Manufacturing/industry and the Federal government (both with substantially higher average offers than state/local government) account for approximately 94% of all offers. Placed in this context, the pertinent question becomes, how can state/local governments be successful in hiring top quality candidates? Persons with a strong commitment to public service may forego a higher offer elsewhere, but this is surely a decided minority.

Included in the College Placement Council salary surveys are the average monthly salary offers to bachelor level civil engineers. The average monthly salary offers made by state and local government and by all types of employers combined, as presented in the CPC reports, were converted to average annual salary offers for use in Table IV. All comparative salary data were then computed from these base figures.

Civil engineering was chosen for analysis in greater depth because civil engineers make up the largest single category of state environmental agency professionals and because vacancy and turnover rates are particularly significant for the engineer category (see Figure 2, page 20).

It is important to note that in Table IV the category "All Types Employers Combined" (section 2) includes the average annual salary offers from the "State/Local Government" category (Section 1). The inclusion of the average from Section 1 lowers the overall average of Section 2. Thus, the actual difference between the offers of state/local governments and those of other employers is greater than the difference between Sections 1 and 2 in the table.

Given these constraints upon the data in Table IV, one must conclude that although the

table clearly indicates a substantial difference between salary offers by state/local governments and offers by all types of employers, the data understate the full extent of the difference specific to state government offers.

One further constraint upon the applicability of the data is that the figures represent all state and local government offers to civil engineers; they are not limited to pollution control and abatement agencies.

TABLE IV

Candidates for Bachelor's Degree in Civil Engineering
National Average Annual Salary Offers
September 1, 1973 – June 30, 1978

	Section 1: STATE/LOCAL GOVERNMENT				Section 2: ALL TYPES EMPLOYERS COMBINED		
Recruiting Period	Sample Size	Percent of Total	Average Annual Salary Offer	Annual % Increase	Sample Size	Average Annual Salary Offer	Annual % Increase
1977-78	384	10.88	$13,608.00	8.72%	3,529	$15,456.00	8.69%
1976-77	223	10.24	12,516.00	4.30	2,178	14,220.00	6.95
1975-76	191	11.36	12,000.00	2.45	1,682	13,296.00	4.14
1974-75	364	13.96	11,712.00	9.29	2,608	12,768.00	10.03
1973-74	253	8.37	10,716.00	N/A	3,024	11,604.00	8.65
Total Offers	1,415	10.87			13,021		
Total Increase			$ 2,892.00	26.99%		$ 3,852.00	33.20%

Section 3: COMPARATIVE DATA

	Salary Dollars	Difference Percent	Consumer Price Index Annual Change
1977-78	$1,848.00	13.58%	7.4%
1976-77	1,704.00	13.61	6.9
1975-76	1,296.00	10.80	5.9
1974-75	1,056.00	9.02	9.3
1973-74	888.00	8.29	11.1
Overall Relative Decline (1 to 2)	$ 960.00	5.29%	

Sources: College Placement Council and U.S. Department of Labor, Bureau of Labor Statistics

The five-year sample period figures indicate three areas of special interest:

1. State/local government (section 1) average annual salary offers to civil engineers are, without exception, lower than those of all types of employers combined (column 2).

2. The gap between state/local government average offers to civil engineers and those of all types of employers combined has increased steadily until 1977-78, when the increase in the state/local government average offer exceeded that of all types of employers combined by 0.03%.

3. Whereas in June, 1974, the discrepancy between the state/local government average offer and that of all types of employers combined was $888 (8.29%); by June, 1978, the difference was $1,848 (13.58%). This is a five-year overall decline of $960 (5.29%) in state/local government average offers relative to all types of employers' combined offers.

Over the past five years, the position of state/local government in the competition for entry level civil engineers has worsened significantly.

One source of comparison for the CPC data is the Endicott Report published by Northwestern University. The Endicott Report includes an annual survey of trends in employment of college and university graduates in business and industry. The salary survey portion consists of beginning salary information obtained from 185 to 225 business and industry employers.

The beginning salary levels for bachelor level engineers (not limited to civil engineers) in the Endicott Report and the CPC surveys are quite close over essentially the same period. The variation in the Endicott beginning salary levels (all types of engineers employed by business and industry) and the CPC salary levels (offers to civil engineers by all types of employers - approximately 90% manufacturing and industry) is from 0.04% to 4%. Some of the variation may be due to the difference in the time frames for the reporting periods; Endicott figures are from January to January, CPC's are from September to July. One other factor may be the reflection of consistently somewhat lower offers to civil engineers as compared with other types of engineers.

An additional corollary to the CPC salary data are the Income Base Rate figures of the National Society of Professional Engineers (NSPE). The Income Base Rate is based upon the national average annual beginning salary for bachelor level engineers. The NSPE Income Base Rate for 1977-78 was $15,400, only $56 less than the average offer to bachelor level civil engineers by all types of employers combined, and $1,792 more than the average of the "competing" offers by state/local agencies.

The NSPE also publishes a detailed, explanatory table of rank and salary increases relative to the Income Base Rate. Education and experience are considered; descriptions of responsibility levels are included. The table, titled, "Position Descriptions and Recommended Income Ranges for Engineers," should be of special interest to senior agency administrators.

Table IV also contains information relevant to the matter of supply and demand. Over the five-year period the total number of offers by state/local governments (section 1) was 1,415; the total for all types of employers combined (section 2) was 13,021. Thus, local and state government

offers represented only 10.87% of the total. Although state and local governments' job offers to civil engineers are a significant portion of the total, they are far from comprising a major portion. There is an abundance of offers from other employers.

Salary levels in state agencies are not matters of whim. They are often the result of intense discussions between agency administrators, who are trying to increase their salary budget to attract qualified personnel, and state legislators, who are trying to appropriate limited funds in the most effective manner. It is essential that agency administrators understand and present realistic arguments which demonstrate the advantages of attracting and retaining qualified employees with an adequate salary schedule. The direct additional expense of hiring and training new personnel and the indirect additional expense of agency inefficiency due to vacancies and turnover make low salary scales for agency employees no bargain. Higher salary schedules will prove a more efficient allocation of limited funds in the long run.

State agencies are in a highly competitive situation. Any disadvantage to agency employment is of major significance because employment opportunities abound elsewhere. Salary levels demonstrably well below the average for the professional field are critical impairments to state agencies' efforts to attract and retain qualified professionals.

Opportunity for Career Advancement

A reasonable opportunity for career advancement is one of the intangible areas of concern to individuals whether seeking a first job or considering a change. Few people desire a "dead end" job unless the alternative is no job. Given the low unemployment figures of the previous section, only a very small percentage of the professionals qualified for pollution control and abatement positions are confronted with this alternative. Opportunity for career advancement may well become the deciding factor in an individual's decision to assume or retain a position with the agency.

Budgetary constraints within agencies can create a multiplier effect which extends beyond the direct impact upon the salary schedule. Training and education opportunities may become fiscally infeasible; job freezes may be imposed. These and other impediments to career advancement are discussed below.

Training and Education Opportunities

Attendance of special training workshops, conferences, and courses has been sharply curtailed among employees of many state agencies in recent

years. Tuition fees and travel expenses are often beyond what the agency is willing or able to pay. Frequently, attendance is infeasible for the above reason and/or because the division is understaffed in a critical area and the time spent away from normal duties is disruptive to the units' operations.

This lack of opportunity for additional training and the limitation upon interaction with colleagues involved in similar tasks is stifling to the employee and the agency. The employee is denied a significant means of keeping current in his field. This impairs his functioning within the agency as it puts him at a disadvantage with his peers in industry whose activities he is charged to evaluate and/or regulate. It further impedes his opportunity for advancement because his professional growth is limited. Finding himself in a "no win" holding pattern such as this, the career conscious professional naturally begins to consider actively seeking another job.

Educational leave, whether it is in the form of a few hours a week or an extended period of time as a semester or year, is not an option available in many agencies. Persons who wish to further their education are limited to enrolling in night courses (if available), taking an extended leave of absence without pay, or resigning from the agency. As a

result, the agency may lose the employee who wishes to upgrade his knowledge base and skills – the very employee the agency can least afford to lose.

Fully cognizant of the need to retain such employees, other states offer 85% to 100% stipends to employees of two or three years to attend graduate school. Unfortunately, this policy often does not produce the desired effect. Employees who return to the agency for the required minimum time subsequent to the educational leave may choose to resign as soon as the basic obligation is fulfilled. A frequently cited reason is thwarted advancement opportunity due to minimal turnover among senior level professionals. Often there is no salary increase subsequent to earning an advanced degree. Thus, the rewards for the extended education are minimized within the agency, and the individual is even more attractive and attracted to potential private sector employers.

Freezes

In recent years, several states have imposed freezes on state agency positions and/or salaries. If a position is vacated, for whatever reason, it cannot be filled either by promotion or hiring for an indeterminate time. Many employees have had their

salary levels frozen for an indeterminant time, with little or no provision for inflation rates. These practices, deemed necessary by states struggling with severe fiscal problems, have had a debilitating effect on many state agency operations and have been instrumental in the decision of employees to leave to further their careers.

Agency Size

A contributing factor to the dilemma of reasonable opportunity for career advancement is the relative size (in terms of numbers of personnel) of any state agency and that of the private sector. The opportunities for advancement are vastly greater in the private sector simply due to the greater number of positions available. It should be recalled that the 1974 National Science Foundation study, "Characteristics of the National Sample of Scientists and Engineers," discussed in the Salaries section above recorded only 3.5% of the sample employed in state government as opposed to 56% in business and industry.

Additional siphons of qualified personnel should not be overlooked. The same NSF study reported 13.3% employed with educational institutions, 9.8%

with the federal government, 3.5% in local government, and 1.9% in other government – all of which boast a substantially higher median annual salary (see Table I).

Opportunity for advancement depends upon a variety of circumstances. Many conditions within and imposed upon state agencies in recent years have not contributed to a situation which offers expanding opportunities for advancement within the agencies. The resulting constraints or career advancement have and will continue to cause professionals to seek other employment.

Meaningful Work

Some divisions of state environmental agencies proudly reported a negligible to nil turnover rate during NE/EWA Phase I interviews. Invariably, competitive salaries was cited as the prime factor. However, pleasant working conditions, recent agency expansion, and/or meaningful work were also credited as important contributing factors to the low employee turnover rate.

Meaningful work is an aspect of employment less tangible than salary, and, therefore, more difficult to assess in concrete terms. The overwhelming majority of state agency employees interviewed during Phase I evidenced a professional attitude toward their job, a dedication to agency goals, and, what can best be described in many instances, as a defensive pride in their work. Assuredly, the defensiveness is a subjective matter, but the fact that it was noted repeatedly by several interviewers is indicative of a significant factor. The instances in which this attitude was discussed in depth proved revealing.

The environmental agency employees characteristically depicted their work as personally rewarding, but often misconstrued and/or unappreciated by the

general public and colleagues within the private sector. This lack of esteem by the people the agency is serving and by other professionals, alike, is contributive to employee turnover, especially among professional positions.

Public Image

When questioned as to what they felt were causal factors in their perception of the public's negative attitude toward their work, agency personnel responded insightfully. Their explanation for the relatively poor public image fell roughly into the following general types:

> Overzealous statements or rash actions by agency personnel (often at the upper administrative level) early in the agency's existence.

It was noted that the public's memory is long, although in most instances, the statements or actions had been rescinded or were inoperative. Furthermore, the bad publicity which resulted was often allowed to just "fade away" rather than be counterbalanced through positive, highly visable action.

> The concurrence of the economic set-back and a peak in environmental legislation and activity.

This factor has been particularly detrimental to agency image and especially difficult to counteract in the public's mind. More recently, an active campaign by major industries and public utilities to link inflation inexorably with environmental regulatory action in television and magazine advertisements, has reinforced the environmental agencies' scapegoat role.

> Society's resistence to change, especially when that change is perceived as an inconvenience to an individual's routine or an infringement upon a time-honored community practice.

The reluctance to accept change imposed from without, coupled with occasional directives or regulations without knowledge or consideration of local circumstances has caused some hostility and derision toward environmental agencies which extend to quite unrelated activities.

> The "crack-pot" image accorded "environmentalists" as a result of the above conditions and occurrences, and the attitudes and actions of radical individuals and ill-informed groups.

This attitude is reinforced periodically through isolated instances being publicized nationwide. The "newsworthiness" of confrontations, demonstrations, etc., far outweigh typical constructive agency activities.

Professional Relationships

Problems experienced by agency employees as they relate to other professionals were alluded to under "Professional Contacts" in the Recruitment section above. Basically, the tension frequently encountered between agency personnel and their private sector counterparts is a mix of antagonism emanating from "being on different sides" and a matter of status.

Different Sides

The antagonisms between private sector employees and those of environmental agency personnel differ little from those in evidence between the private sector and most regulatory agencies. What differences there are seem to be in terms of respect. That is, the antagonism may be more bitter in these instances because of the lack of appreciation or of respect for the mandate of the agency. Perhaps, as environmental agencies mature and come to be accepted as other than an afterthought on the part of government, these attitudes will change for the better.

Status

The matter of status is a bit more complex. Employees derive status from the employer. Person-

al considerations notwithstanding, the greater the age, size, and prestige of the organization, the higher is the status accorded the employee among his peers.

State environmental agencies are relatively new, small, and not very prestigious. This often translates into feelings of second-rate professional status among agency people. Additionally, the effects of this stigma are compounded because of status disparities between the state and federal level very similar to those between the state agency and large corporations. And, of course, the role of salary as a determinant of status cannot be overlooked.

The agency professional is confronted with conflicting emotions and values. He may be deeply committed to and proud of his role in the mission of the agency. At the same time, he must try to reconcile his commitment and the reduced level of esteem he perceives because of that commitment. Frequently, that reconciliation is not forthcoming.

Job Continuity

Job continuity may be a factor affecting the meaningfulness of work in the sense that priorities are likely to remain more constant and greater continuity prevail in the private sector. Industry

is not as exposed to the ever-present possibility of politically determined administrative changes and shifting emphases at the federal level which affect state agencies. Changes in priorities can promote bewilderment and/or dissatisfaction, neither of which adds to the meaningfulness of one's work.

The career conscious individual who considers the increased esteem and greater likelihood of job continuity available in the private sector and adds the factor of increased earning power is likely to find that his commitment to the state agency is not overwhelming.

SUMMARY/CONCLUSION

–Employee turnover rates are sufficiently high among environmental pollution control and abatement agencies to be disruptive to task accomplishment essential to fulfillment of agency mandates.

–Indisputably, employee turnover is a perennial problem of major proportion. It poses a significant impediment to the achievement and maintenance of an acceptable performance level within affected agencies. The causes of turnover, therefore, are critical to the agency.

–The recruitment process of state environmental agencies should be subjected to critical review. Efforts to ameliorate the conditions which compromise the attraction, hiring, and subsequent retention of highly qualified personnel will result in marked improvement in overall agency performance.

–State agencies are in a highly competitive situation. Any disadvantage to agency employment is of major significance because employment opportunities abound elsewhere. Salary levels demonstrably well below the average for the professional

field are critical impairments to state agencies' efforts to attract and retain qualified professionals.

—Opportunity for advancement depends upon a variety of circumstances. Many conditions within and imposed upon state agencies in recent years have not contributed to a situation which offers expanding opportunities for advancement within the agencies. The resulting constraints on career advancement have and will continue to cause professionals to seek other employment.

—The career conscious individual who considers the increased esteem and greater likelihood of job continuity available in the private sector and adds the factor of increased earning power is likely to find that his commitment to the state agency is not overwhelming.

Pollution control and abatement efforts are weakened by state agency personnel problems. Programs of national scope with the highest Federal priorities are affected. Severe shortfalls of anticipated goals may result.

Indeed, the existence of relatively high employee turnover and the resulting difficulties within the state agency itself are sufficient reason for critical evaluation and solid remedial action. Because the ramifications of state agency personnel problems project well beyond the state agencies' internal affairs; immediate, extensive remedial action is imperative to avert substantial disruption to national pollution control and abatement activities.

BIBLIOGRAPHY

Blaser, Zeni, and Company. Handbook for Achieving Adequate Salaries for State Environmental Positions. Prepared for the Water Planning Division, U. S. Environmental Protection Agency. Chicago: Blaser, Zeni, and Co., 1976.

College Placement Council. A Study of 1973-74 Beginning Offers, Final Report, July, 1974. Bethlehem, Pennsylvania: The College Placement Council, 1974.

_____. A Study of 1974-75 Beginning Offers, Final Report, July, 1975. Bethlehem, Pennsylvania: The College Placement Council, 1975.

_____. A Study of 1975-76 Beginning Offers, Final Report, July 1976. Bethlehem, Pennsylvania: The College Placement Council, 1976.

_____. A Study of 1976-77 Beginning Offers, Final Report, July, 1977. Bethlehem, Pennsylvania: The College Placement Council, 1977.

_____. A Study of 1977-78 Beginning Offers, Final Report, July, 1978. Bethlehem, Pennsylvania: The College Placement Council, 1978.

Council on Environmental Quality. Environmental Quality, 1976, The Seventh Annual Report of the Council on Environmental Quality. Washington, D.C.: U. S. Government Printing Office, 1976.

Edmunds, Stahre and John Letey. "Engineering Degree Statistics and Trends--1977." Engineering Manpower Bulletin. May, 1978.

Endicott, Frank S. The Endicott Report, 1973. Trends in Employment of College and University Graduates in Business and Industry, 27th Annual Report. Evanston, Illinois: Northwestern University, 1972.

_____. The Endicott Report, 1974. Trends in Employment of College and University Graduates in Business and Industry, 28th Annual Report. Evanston, Illinois: Northwestern University, 1973.

_____. The Endicott Report, 1975. Trends in Employment of College and University Graduates in Business and Industry, 29th Annual Report. Evanston, Illinois: Northwestern University, 1974.

_____. The Endicott Report, 1976. Trends in Employment of College and University Graduates in Business and Industry, 30th Annual Report. Evanston, Illinois: Northwestern University, 1975.

_____. The Endicott Report, 1977. Trends in Employment of College and University Graduates in Business and Industry, 31st Annual Report. Evanston, Illinois: Northwestern University, 1976.

Lecht, Leonard A. Changes in National Priorities. Washington, D.C.: National Planning Association, 1972.

———. Changes in Occupational Characteristics: Planning Ahead for the 1980's. New York: The Conference Board, Inc., 1976.

———. Manpower Needs for National Goals in the 1970's. New York: Frederick A. Praeger, 1969.

Lecht, Leonard A., I. Gutmanis, and R.J. Rosen. Assessing the Impact of Changes in National Priorities for the Utilization of Scientists and Engineers. National Science Foundation Grant GR 32464. Washington, D.C.: National Planning Association, 1974.

Lederman, Leonard, and Margaret Windus. Federal Funding and National Priorities. New York: Frederick A. Praeger, 1971.

National Field Research Center. A National Environmental/Energy Workforce Assessment, Phase I (70 volumes). Prepared for the Office of Federal Affairs, U.S. Environmental Protection Agency. Iowa City, Iowa: National Field Research Center, Inc., 1977.

National Research Council. Characteristics of Doctoral Scientists and Engineers in the United States, 1975. Survey of Science Resources Series. Washington, D.C.: National Science Foundation; Washington, D.C.: Government Printing Office, 1977.

National Research Council Commission for the Study of Environmental Manpower. Manpower for Environmental Pollution Control (Volume 5). Washington, D.C.: National Academy of Sciences, 1977.

National Science Foundation. National Sample of Scientists and Engineers: Median Annual Salaries, 1974. Manpower Characteristics Studies Group, Division of Science Resources Studies, Sciences Resources Studies Highlights, NSF 75-332. Washington, D.C.: U.S. Government Printing Office, 1975.

National Society of Professional Engineers. 1977-78 Recommended Income Ranges for Professional Engineers. NSPE Publication No. 0006. Washington, D.C.: National Society of Professional Engineers, 1977.

Schildhaver, Carol. Environmental Information Sources: Engineering and Industrial Applications: A Selected and Annotated Bibliography. New York: Special Libraries Association, 1972.

Thibeau, Charles E. Annual Directory of Environmental Information Sources. Boston: Cahners Books, 1972.

U.S. Department of Commerce. Bureau of the Census. Current Population Reports, Series P-23, No. 53. Washington, D.C.: U.S. Government Printing Office, 1974.

_____. Environmental Quality Control: Governmental Finances and Employment; Fiscal Years 1971-72 and 1972-73. Washington, D.C.: U.S. Government Printing Office, 1975.

_____. Environmental Quality Control: Governmental Finances: Fiscal Year 1974-75. State and Local Government Special Studies, No. 86. Washington, D.C.: U. S. Government Printing Office, 1978.

U.S. Department of Labor. Bureau of Labor Statistics. "Impact of Federal Pollution Control and Abatement Expenditures on Manpower Requirements." Bulletin 1836. Washington, D.C.: U.S. Government Printing Office, 1975.

_____. Monthly Labor Review. Vol. 97, No. 8. Washington, D.C.: U.S. Government Printing Office, 1974.

_____. Monthly Labor Review. Vol. 98, No. 8. Washington, D.C.: U.S. Government Printing Office, 1975.

_____. Monthly Labor Review. Vol. 99, No. 8. Washington, D.C.: U.S. Government Printing Office, 1976.

_____. Monthly Labor Review. Vol. 100, No. 8. Washington, D.C.: U.S. Government Printing Office, 1977.

_____. Monthly Labor Review. Vol. 101, No. 8. Washington, D.C.: U.S. Government Printing Office, 1978.

U.S. Office of Management and Budget. Special Analyses: Budget of the United States Government, Fiscal Year 1977. Washington, D.C.: U.S. Government Printing Office, 1976.